SPECIFICATION
(page 1)

*This is a marked up copy of the original specification (10/051,947).*
*A substitute, clean-version specification is also being submitted as*
*to incorporate extensive **amendments** (as per 37 CFR 1.125), and*
*to place the sections in the correct order.*

TITLE OF INVENTION:      HARDWAY

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3/28/04 Edward Appleton Gaylor

## BRIEF SUMMARY OF THE INVENTION

*(This section was also moved in the attached substitute specification in order that it be placed in the correct order).*

Most games involving the throwing of dice and the movement of pieces have one of the following 2 characteristics:

1. One die is thrown and the corresponding piece (#1,#2,#3,#4,#5,#6) is moved one square.
2. 2 dice are thrown and the person whose turn it is moves 'his piece' a number of squares corresponding to the total of the numbers on the 2 dice.

But what about throwing 2 dice and having the piece move that corresponds to the total of the numbers on the 2 dice? - This would not be fair, because for example: the #7 piece would get to move much more often that the #10 piece. – My invention solves this problem in a unique manner.

- This is done by having a game playing surface where the **ratio** of the number of squares, for each of the different numbered pieces, corresponds to its mathematical probability.

*(The next 3 underlined sentences are a more detailed explanation of combining the horse race and craps into the same game layout and should not be considered as "new matter", as this idea was previously introduced in this original application (10/051/947) in the BACKGROUND OF INVENTION SECTION, THE BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S) SECTION, AND THE DETAILED DESCRIPTION OF THE INVENTION SECTION. This idea (combining the horse race and craps into the same game layout) was further elaborated on in the Continuation-in-part applications: # 10/387,928 (03/13/2003) and # 10/425/812 (04/29/03), where it was included in the CLAIMS and DRAWING(S) SECTIONS. It has also been included in this amendment. I guess I should have just filed a preliminary amendment to the original application instead of the two continuation-in-parts, and saved myself $750).*

Additionally, certain aspects of the game of craps are added and combined with the playing surface mentioned in the previous sentence, to create a new and unique game. Combining the horserace and craps game into one playing surface where both games are played simultaneously, solves the problem for a casino of not having enough decisions per hour from the horserace alone. - More detailed explanation is given in the 'Detailed Description of the Invention' and 'Background' SECTIONS.

~~- This is explained in detail in the 'Detailed Description of the Invention' SECTION.~~

SPECIFICATION
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CROSS REFERENCE TO RELATED APPLICATIONS

*(This section was also moved in the attached substitute specification in order that it be placed in the correct order).*


~~Not Applicable.~~


This is a revision to the non-provisional application # **10/051,947** which had two non-provisional **Continuation-in-parts** subsequently filed to it:


1. Application # **10/387,928** which had a filing date of **03/13/2003.**
2. Application # **10/425,812** which had a filing date of **04/29/2003.**

SPECIFICATION
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STATEMENT REGARDING FEDERALLY SPONSORED RESEARCH OR DEVELOPMENT

*(This section was moved in the attached substitute specification in order that it be placed in the correct order).*


Not Applicable.

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REFERENCE TO A MICROFICHE APPENDIX

*(This section was replaced with the*

*"INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC" Section*

*placed in the correct order in the attached substitute specification).*

Not Applicable.


INCORPORATION-BY-REFERENCE OF MATERIAL SUBMITTED ON A COMPACT DISC

Not Applicable.

## DETAILED DESCRIPTION OF THE INVENTION

*(This section was also moved in the attached substitute specification in order that it be placed in the correct order).*

My invention takes into account the following:

1. The piece numbers that are used are the numbers 4, 5, 6, 7, 8, 9, and 10.

2. From this point on, the piece numbers in the previous sentence (# 1.), will be referred to as the 4-horse, 5-horse, 6-horse, 7-horse, 8-horse, 9-horse, and 10-horse, respectively.   (figure 5)

3. A pair of 'normal' dice (figure 4) is used (i.e. each die is a 6-sided cube and has a number of dots on each side (surface) corresponding to the numbers 1, 2, 3, 4, 5, and 6). Dice that are used at a casino craps table should be used to make sure that they are perfectly balanced.

4. The **ratio** of the number of squares for the 6, 7, or 8 horses as compared to the 4, 5, 9, or 10 horses would be 3 to 2.   For example: the 7-horse could have 18 squares to move, and the 9-horse could have 12 squares to move.

5. This ~~perfect~~ratio is completed by having the 4, 6, 8, and 10 horses move 2 squares on a double (or Hardway), whose sum corresponds to the particular horse.  (e.g. the 8-horse would move 2 squares forward on a double 4).

6. Additionally,
   whenever it is a *come out roll* during the craps game,  which is incorporated into the same playing surface as the horse race, and is being played simultaneously;

   the 7-horse moves 2 squares forward when a sum of 11 is thrown, and
   1 square backward when a sum of 2, 3, or 12 (craps) is thrown.

7.   The following is a detailed description of the method for moving the horses, based on the outcome of the dice:

if there is a '1' facing up on one die and a '3' facing up on the other die, resulting in a total of '4', then the 4-horse would move 1 square forward;

if there is a '3' facing up on one die and a '1' facing up on the other die, resulting in a total of '4', then the 4-horse would move 1 square forward;

if there is a '2' facing up on one die and a '2' facing up on the other die (also known as "doubles" or known as a hardway in craps), resulting in a total of '4', then the 4-horse would move 2 squares forward;

if there is a '2' facing up on one die and a '3' facing up on the other die, resulting in a total of '5', then the 5-horse would move 1 square forward;

if there is a '3' facing up on one die and a '2' facing up on the other die, resulting in a total of '5', then the 5-horse would move 1 square forward;

if there is a '2' facing up on one die and a '4' facing up on the other die, resulting in a total of '6', then the 6-horse would move 1 square forward;

if there is a '4' facing up on one die and a '2' facing up on the other die, resulting in a total of '6', then the 6-horse would move 1 square forward;

if there is a '3' facing up on one die and a '3' facing up on the other die (also known as "doubles" or known as a hardway in craps), resulting in a total of '6', then the 6-horse would move 2 squares forward;

if there is a '3' facing up on one die and a '4' facing up on the other die, resulting in a total of '7', then the 7-horse would move 1 square forward;

if there is a '4' facing up on one die and a '3' facing up on the other die, resulting in a total of '7', then the 7-horse would move 1 square forward;

if there is a '3' facing up on one die and a '5' facing up on the other die, resulting in a total of '8', then the 8-horse would move 1 square forward;

if there is a '5' facing up on one die and a '3' facing up on the other die, resulting in a total of '8', then the 8-horse would move 1 square forward;

if there is a '4' facing up on one die and a '4' facing up on the other die (also known as "doubles" or known as a hardway in craps), resulting in a total of '8', then the 8-horse would move 2 squares forward;

if there is a '4' facing up on one die and a '5' facing up on the other die, resulting in a total of '9', then the 9-horse would move 1 square forward;

if there is a '5' facing up on one die and a '4' facing up on the other die, resulting in a total of '9', then the 9-horse would move 1 square forward;

if there is a '4' facing up on one die and a '6' facing up on the other die, resulting in a total of '10', then the 10-horse would move 1 square forward;

if there is a '6' facing up on one die and a '4' facing up on the other die, resulting in a total of '10', then the 10-horse would move 1 square forward;

if there is a '5' facing up on one die and a '5' facing up on the other die (also known as "doubles" or known as a hardway in craps), resulting in a total of '10', then the 10-horse would move 2 squares forward;

if it is the "come out" roll in the craps game which is being played simultaneously and there is a '1' facing up on one die and a '1' facing up on the other die (also known as "craps" in craps), resulting in a total of '2', then the 7-horse would move 1 square backwards;

if it is the "come out" roll in the craps game which is being played simultaneously and there is a '1' facing up on one die and a '2' facing up on the other die (also known as "craps" in craps), resulting in a total of '3', then the 7-horse would move 1 square backwards;

if it is the "come out" roll in the craps game which is being played simultaneously and there is a '2' facing up on one die and a '1' facing up on the other die (also known as "craps" in craps), resulting in a total of '3', then the 7-horse would move 1 square backwards;

if it is the "come out" roll in the craps game which is being played simultaneously and there is a '6' facing up on one die and a '6' facing up on the other die (also known as "craps" in craps), resulting in a total of '12', then the 7-horse would move 1 square backwards;

if it is the "come out" roll in the craps game which is being played simultaneously and there is a '5' facing up on one die and a '6' facing up on the other die (also known as "the yo" in craps), resulting in a total of '11', then the 7-horse would move 2 squares forward;

if it is the "come out" roll in the craps game which is being played simultaneously and there is a '6' facing up on one die and a '5' facing up on the other die (also known as "the yo" in craps), resulting in a total of '11', then the 7-horse would move 2 squares forward;

resulting in a very even horse race.

7. The enclosed diagram shows a layout of a racetrack,

8. Figure-1 shows the layout of the racetrack only

which takes into account this 3:2 ratio.

8. This diagram could be placed between the 'pass line' and the outside edge of a craps table, and then would be used simultaneously while a game of craps was being played. This diagram could also be used and played on a standalone table, independent of a craps table.

9. Figure-2 shows the layout of the racetrack incorporated with certain aspects of a craps game.

10. Figure-3 is a similar to figure-2, but has only one race length (4-furlongs).

11. Figure-4 shows the two 6-sided dice, each of which is a cube and has a number of dots on each side (surface) corresponding to the numbers 1, 2, 3, 4, 5, and 6.

12. Figure-5 shows what each one of the horses would look like (chess knights).

CLAIMS

*(Claim 1 was canceled because it was incorrectly written and contained more than one sentence, and should have been written as several claims instead of one. Additionally, new claims have been added to explain the idea of combining craps and the horse race into the same game. - This is not new matter as it was previously introduced in the original of this application in the BACKGROUND OF INVENTION SECTION, THE BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S) SECTION, AND THE DETAILED DESCRIPTION OF THE INVENTION SECTION.*

1. (canceled)

What I claim as my invention is the following:

2. (new): A game playing surface which combines horse racing lanes and certain aspects of craps in the same surface including:

seven horse racing lanes each with a starting and finishing point for seven different horse playing pieces, each lane being divided into a number of squares;

seven different horse playing pieces which are numbered 4, 5, 6, 7, 8, 9, and 10;

betting areas for each horse bet that is offered;

betting areas for each craps bet that is offered;

separate betting areas for each person playing the game;

two identical 6-sided dice cubes with dots on each side (surface) of each die corresponding to the numbers 1, 2, 3, 4, 5, or 6;

casino chips to make horse bets and craps bets.

3. (new): A game playing surface in claim 2 where the **ratio** of the number of squares in the horse racing lanes needed to be covered to go from the starting point to the finishing point for the purpose of winning a race for the 6, 7, or 8 horses as compared to the 4, 5, 9, or 10 horses is **3:2.**

4. (new): A game playing surface in claim 2 where each person playing the game has their own betting areas for each of the seven horses that are racing.

5.  (new):  A game playing surface in claim 2 where the craps wagers that are offered include: place bets, pass-line bets, don't pass-line bets, laying odds bets, taking odds bets, hardway bets, field bets, and C-E-7 bets.

6.  (new):  A game playing surface in claim 2 where each person playing the game has their own betting areas for each of the craps bets that are offered.

7.  (new):  A method for playing the game playing surface in claim 2 where the dice are "rolled" by one of the players whereby the arithmetic total of the two dice of a particular roll determines which horse to move and at the same time determines the outcome of the craps betting.

8.  (new):  A method for playing the game playing surface in claim 2 where the dice are "rolled" by one of the players whereby whether or not it is the "come out" roll in the craps game, affects the movement of the 7-horse.

9.  (new):  A method for playing the game playing surface in claim 2 where prior to the start of a horse race, players place their bets on the horses and then are not allowed to change their horse bets until the race is over.

10.  (new):  A method for playing the game playing surface in claim 2 where each new horse race only starts when it is the "come out" roll in the craps game which is being played simultaneously.

11.  (new):  A method for playing the game playing surface in claim 2 where players place their craps bets based on the betting rules of craps and the payout of these craps bets is being determined by the same roll of the same dice which are controlling the horse race which is happening simultaneously on the same playing surface.

BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

*(This section was also moved in the attached substitute specification in order that it be placed in the correct order).*

**Figure-1**

~~The enclosed drawing~~ illustrates a game layout where the **ratio** of the number of squares

for the 6, 7, or 8 horses as compared to 4, 5, 9, or 10 horses is 3:2.

There are

~~6~~

<u>3</u>

different starting points in the enclosed diagram which all incorporate this 3:2 ratio:

1½ miles (18:12),

~~1¼ miles (15:10),~~

1 mile (12:8),

~~6F or 6 furlongs (9:6),~~

4F or 4 furlongs (6:4).

~~and 2F or 2 furlongs (3:2).~~

~~The diagram depicted would be placed between the 'pass line' and the outside edge of a craps~~

~~table, and then would be used simultaneously while a game of craps was being played.~~

~~People would bet on any or all of the horses (4,5,6,8,9,10) other than the 7 horse.~~
~~When one of these horses wins (crosses the finish line first), an equal amount of money~~
~~would be paid corresponding to the amount bet on that particular horse, except that a 5%~~
~~commission would be taken out by the house. All other bets would be returned.~~
~~If the 7 horse wins, then all bets would lose.~~

*( Figures 2 and 3 illustrate the horserace track combined with the game of craps. - This is not new matter as it was previously introduced in the original of this application in the BACKGROUND OF INVENTION, THE BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING(S), AND THE DETAILED DESCRIPTION OF THE INVENTION SECTIONS).*

*(Figures 4 and 5 are just pictures of the dice and horses, respectively).*

**Figure-2** illustrates the horserace track combined with certain aspects of the game of craps. In addition to being able to bet on the horses, players can bet on the Pass-Line, Don't-Pass-Line, Place bets, Hardways, C-E-7 bets (any-Craps, Eleven, 7 bets), Take odds, or Lay odds. (The terms in the previous sentence are all known terms to the game of craps).

    People would bet on any or all of the horses (4,5,6,7,8,9,10). These bets are 'capped' with special chips that say "Race Closed" that are placed on top of the betting chips. This means that once a race starts, there is no more horse-betting until the next race. The horse pieces used in my game are chess knights. When one of these horses wins (crosses the finish line first), money is paid at pre-determined house odds to the players with bets on the winning horse – bets on the other horses lose. All races start on a *come out* roll. When a race ends, the next race does not start until the next *come out* roll. Basically what happens is that the players make their horse bets, the bets are capped by the dealer, then the players make their craps bets. The dice are thrown by whomever happens to be the shooter for the craps game, and the craps game available bets are made and paid as they normally would be paid. While the players are throwing the dice and playing the craps part of the game, the dealer moves the horses on the racetrack part of the game, based on the same total of the same dice.


**Figure-3** is a variation of Figure-2. One difference is that the 4F (4 furlong) race has been moved to the center of the playing surface, with the other two race lengths and starting points (1 mile and 1 1/2 mile) being eliminated. The ratio of squares for the horses to cover is still the same as in figure-1 and figure-2. Additionally the 'FIELD' bet (a normal accepted bet in the game of craps) has been added. The advantages to this layout are that casinos may only want to run the 4-furlong race; the horse racing area is separated from where players place their chips; and the 'FIELD' bet has been added for the players.

**Figure-4** illustrates the two 6-sided dice used in playing my game, each of which is a cube and has a number of dots on each side (surface) corresponding to the numbers 1, 2, 3, 4, 5, and 6.

**Figure-5** illustrates what each one of the horses would look like (chess knights), used in playing my game.

## BACKGROUND OF INVENTION

*(This section was also moved in the attached substitute specification in order that it be placed in the correct order).*

### (1) Field of the Invention:

This invention pertains to the general field of endeavor relating to games which are played by throwing a pair of dice and moving pieces,

and betting on the outcome of the dice.

(2) Description of Related Art:

I am also the inventor of a board game named Hardway which makes use of the
~~basic principle of this idea.~~

horserace aspect of this idea but is quite different in many respects – both in layout
and in method of play.
 Although my game as been in the public domain for more than one year, its use of this invention
is not specifically explained,

and additionally, my board game does not include the certain aspects of craps previously mentioned.
 ~~I believe this is o.k.~~
~~Also, this application that I am submitting for a patent, has the basic shape~~
~~of the playing board altered so that it will fit into the outer edges of a craps table in order~~
~~that it can be played simultaneously with the game of craps.~~

– Also, in the board game you can bet on all the horses **except** the 7-horse, and you only lose
when the 7-horse wins, and you only win when the horse you bet on wins – else your bet(s) are
returned. In this application that I am submitting for a patent, you can bet on all the horses, **including**
the 7-horse, and you win when the horse you bet on wins and you lose when the horse you bet on
loses. (This method of allowing betting on the 7-horse is better because it is easier to understand
for the player, and there are more decisions per hour for the casino.) Also, in the board game the
players are issued different color chips from the other players to distinguish their bets which are
made in a common betting area for each horse. – In this application that I am submitting for a
patent, the lanes of the races track have been widened (in comparison to the board game) so that
they can accommodate normal casino-sized chips. – The players can then use the casino's regular
chips for betting right on the racetrack in areas that are directly in front of each player, and there
is no need for colored or special chips (as in the board game) to distinguish player bets from one
another. Also, this application that I am submitting for a patent has the basic shape of the playing
surface from the board game altered so that it will fit onto a "black jack" type table that is commonly
used in a casino. Additionally, several features of a normal craps game have cleverly been added so
that the horserace and craps game are played simultaneously on the same playing surface.

The combination of the idea not being obvious in the board game, the alteration to the original board game playing shape - betting areas and rules for method of play, the addition of the aspects of craps, and the fact that everything here were my original ideas (the unique layout and rules); should make this invention eligible for a patent.

Hopefully, the combination
of the idea not being obvious in the board game, the alteration to the original playing
shape, and the fact that everything here were my original ideas; will make this invention
eligible for a patent.

When I originally filed this non-provisional application ( # 10/051,947 - filing date 01/22/2002 ), I was unaware of the USPTO website containing search capabilities on previous patents. - Having now searched this website, I have found some existing or expired patents that have some similar features to my game, which I previously knew nothing about. The following is discussion of these patents, how they are different from my application, and what features of my game are improved differences.

Patent # 4,986,546 (Cerulla - 01/22/1991) - This patent involves a horse racing game where 3 dice are used: 2 dice are the same color, and the 3rd die is a different color from the other two that are the same. The 2 dice that are the same determine which 2 horses to move, and the 3rd die indicates how many squares. - This game is quite different from mine, because of the 3 dice and how they are used to determine which horse(s) move and how many squares. Also, the horse numbers used are 1,2,3,4,5,6, as opposed to my game which uses horse numbers 4,5,6,7,8,9,10. In my game, a horse moves 1 or 2 squares based on the *total* of 2 dice, the board layout is very different with its built in 3:2 ratio, and of course, my game includes the craps aspects, which this game does not.

Patent # 5,839,726 ( Luise - 11/24/1998 ) - This patent involves a horse racing game where 3 dice are used.  If  2 sixes and 1 three were thrown for example, then the 6-horse would move 2 squares, and the 3-horse would move 1 square.  This game is quite different from mine, because of the 3 dice and how they are used to determine which horse(s) move and how many squares.  Also, the horse numbers used are 1,2,3,4,5,6, as opposed to my game which uses horse numbers 4,5,6,7,8,9,10.  In my game, a horse moves 1 or 2 squares based on the *total* of 2 dice, the board layout is very different with its built in 3:2 ratio, and of course, my game includes the craps aspects, which this game does not.


Patent #4,060,246 (Ward - 11/29/1977 (expired, I believe)) - This patent involves a horse racing game where 2 dice are used, and is the most similar patent to my game that I could find, but still has many differences.  The horses move based on the total of the two dice, and horses move a certain number of squares (length of gallops) based on a chart in the patent.  This chart is based on the expected proportion between the horses.  For example:  the 4-horse's 'gallop' is twice as long as the 7-horse's gallop because the outcome of a 4 is one half as likely as the outcome of a 7.  Another example of the setup for L.Ward's game would be that the 2-horse's gallop is six times as long as the 7-horse's gallop because the outcome of a 2 is one sixth as likely as the outcome of a 7.  This is supposed to provide for an exactly even race, but in fact it does not as the expected winning probability for the 7-horse in this game would be approximately .02, and the expected winning probability for 2-horse would be approximately .24.  -  This is for the "1 gallop(s) to finish" for the 2-horse vs. "6 gallops to finish" for the 7-horse (or 1-furlong race) version of L. Ward's game. - These expected winning probabilities are not very close.  - I will explain in the next paragraph why even though the theory behind L.Ward's patent seems correct, in reality it is not.  - My game is again different from this game because the layout for the horse race incorporates the expected probabilities basically into the game board, instead of incorporating the probabilities into the length of the moves. - i.e. My game has less squares proportionally for the 4-horse vs. the 7-horse, instead of having the 4-horse covering more squares (as opposed to the 7-horse) when it moves in L. Ward's game.   Also, patent #4,060,246 (Ward - 11/29/1977),  does not have double moves for the doubles (22, 33, 44, 55) and the proportional squares to handle this or the special moves for the 7-horse on a total of 2, 3, 11, or 12.  Also, L. Ward's game has horses numbered 2,3,4,5,6,7,8,9,10,11,12, as opposed to my game which uses horse numbers 4,5,6,7,8,9,10.  And finally, of course, my game includes the craps aspects and patent #4,060,246 (Ward - 11/29/1977) does not.

Here is an explanation of why the horses in patent #4,060,246 (Ward - 11/29/1977) do not have a very even chance of winning. Let's just take the 2-horse vs. the 7-horse and a 1 furlong race for simplicity. In patent #4,060,246 (Ward - 11/29/1977) the 2-horse would have 1 gallop to win (length of gallop is 60) and 7-horse would have 6 gallops to win (length of gallop is 10). This is basically based on the fact that if you threw 2 dice 36 times, you would expect six-7s (total of dice is 7) and one-2 (total of dice is 2) to be in your outcome. - Here's the problem: if you threw the dice 19 times, then the probability of one 2 (total of dice) being thrown is greater than .5, whereas the probability of six-7s (total of dice is 7) being thrown is far less than .5. As a matter of fact, the probability of six-7s (total of 7) being thrown does not exceed .5 until the 34th throw. - Therefore we can see that in this example basically, the 2-horse has a much better chance of winning (approximately .24) than the 7-horse (.02). Remember that once the 2-horse moves one square, he wins and the race is over. In the discussion of my game farther down in this section, I will explain where these probabilities came from.

In general, none of these patents ( # 4,986,546 -Cerulla - 01/22/1991, # 5,839,726 -Luise- 11/24/1998, #4,060,246 -Ward - 11/29/1977 ) involve the craps aspects in addition to the horse race. This is a very important difference and improvement with my game. My horse race flows as a natural offshoot of a craps game which is being played on the same playing surface simultaneously. This is a very important aspect to the casino that will be running my game. The casino will not only generate the revenue that they would normally get from the craps aspect of my game, but they will also be generating revenue from the horse race, simultaneously. - This is a very important advantage of my game because a horserace by itself will not generate as many decisions (bets paid or collected) per hour as a casino would normally like to have.

   The following is a discussion of the expected probabilities of winning for the horses in my game:
In the 4-furlong race, the 6, 7, & 8 horses have 6-squares to cover and the 4, 5, 9, & 10 horses have
4 squares to cover.  This ratio of squares (3:2) between the 6, 7, or 8 horses and the 4, 5, 9, or 10 horses,
combined with the rule that even numbered horses (4,6,8,10) move 2 squares when a corresponding
hardway (doubles) is thrown, plus the rule for the 7-horse that it (the 7-horse) on a *come out* roll only
(*come out* is a term/rule that pertains to the game of craps), moves 2 squares forward when an 11 thrown,
and one 1 square backwards when craps (a total of 2, 3, or 12) is thrown; results in a very even race for
the horses.  At first glance, one might think that the probability of winning would be exactly even for each
horse, but even though it is very close, it is not exactly even but within a few hundredths - which
produces a very 'even' horse race.   With 36 rolls of the dice, you would expect on average six-7s, five-8s,
five-6s, four-5s, four-9s, three-4s, and three-10s; and in fact this is what you would get.  (The 4,6,8,10
horses have an extra square to cover because they move 2 squares forward on doubles.)  Additionally, you
would expect four-craps (2-3-3-12) and two-11s.   In order to compute the theoretical probability for my
game you would have to write down all the possible states that the seven horses could be in (55,296), and
then figure out the probability for each of these states.  Then put these probabilities along with their
associated probabilities of moving from one state to the next in a 55,303 x 55,303 matrix.  - This is of
course an unreasonable and almost impossible task, so a simulation program was written to generate the
expected probabilities of winning for the seven horses.  (Simulation is an accepted method for predicting
expected probabilities, particularly when a theoretical proof is impossible or impracticable.)  Using a
random number generator (and verifying that the numbers that were generated followed the expected
probabilities for two, fair, 6-sided dice - numbered 1,2,3,4,5,6 on each die) and simulating 660,000,000
rolls of the dice for **my 4-furlong race,** I obtained the following results:

   The 4 or 10 horse's expected probability of winning would be  .174285905

   The 5 or  9 horse's expected probability of winning would  be  .141276290

   The 6 or  8 horse's expected probability of winning would be  .114579681

   The        7 horse's expected probability of winning would be  .139716249

These numbers for **my 4-furlong race** are close enough to produce very even racing, which is what you want. The odds paid by the casino can be adjusted according to a particular horse's probability to gain the expected house advantage that the casino desires. For example, if the 4-horse was given pay-out odds of 4-1, and the 5-horse was given pay-out odds of 5-1, then the expected house advantage for the 4-horse would be 12.85% and the expected house advantage for the 5-horse would be 15.22%. These advantages are in line with the number of rolls to finish an average race of this length (18.1 rolls).

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I altered my program to run simulations for patent #4,060,246 (Ward - 11/29/1977) for expected outcomes for 200,000,000 random rolls of the dice (3 furlong race), and obtained the following results:

The 2 or 12 horse's expected probability of winning would be   .219416205

The 3 or 11 horse's expected probability of winning would be   .112687414

The 4 or 10 horse's expected probability of winning would be   .070255134

The 5 or  9 horse's expected probability of winning would be   .048487350

The 6 or  8 horse's expected probability of winning would be   .035565865

The       7 horse's expected probability of winning would be   .027176063

It is evident that patent #4,060,246 (Ward - 11/29/1977) does not produce even racing.

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Simulating 200,000,000 random rolls of the dice for **my 1 mile race**, I obtained the following results:

The 4 or 10 horse's expected probability of winning would be   .174399455

The 5 or  9 horse's expected probability of winning would be   .138760759

The 6 or  8 horse's expected probability of winning would be   .116706445

The       7 horse's expected probability of winning would be   .140266683

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Simulating 200,000,000 random rolls of the dice for **my 1 1/2 mile race**, I obtained the following results:

The 4 or 10 horse's expected probability of winning would be   .174808034

The 5 or  9 horse's expected probability of winning would be   .137566845

The 6 or  8 horse's expected probability of winning would be   .117543818

The       7 horse's expected probability of winning would be   .140162606

The results for the 1 mile and 1 1/2 mile races for my game continue to produce very even racing which is very similar to my 4-furlong race.

ABSTRACT OF DISCLOSURE

*(This section was also moved in the attached substitute specification in order that it be placed in the correct order).*

Hardway is an invention which deals with a new way of dealing with
games which involve throwing a pair of dice and moving game pieces.
It is unique, because the corresponding pieces are moved based on the sum
of 2 dice
on a unique layout with unique rules, and also because this same layout incorporates
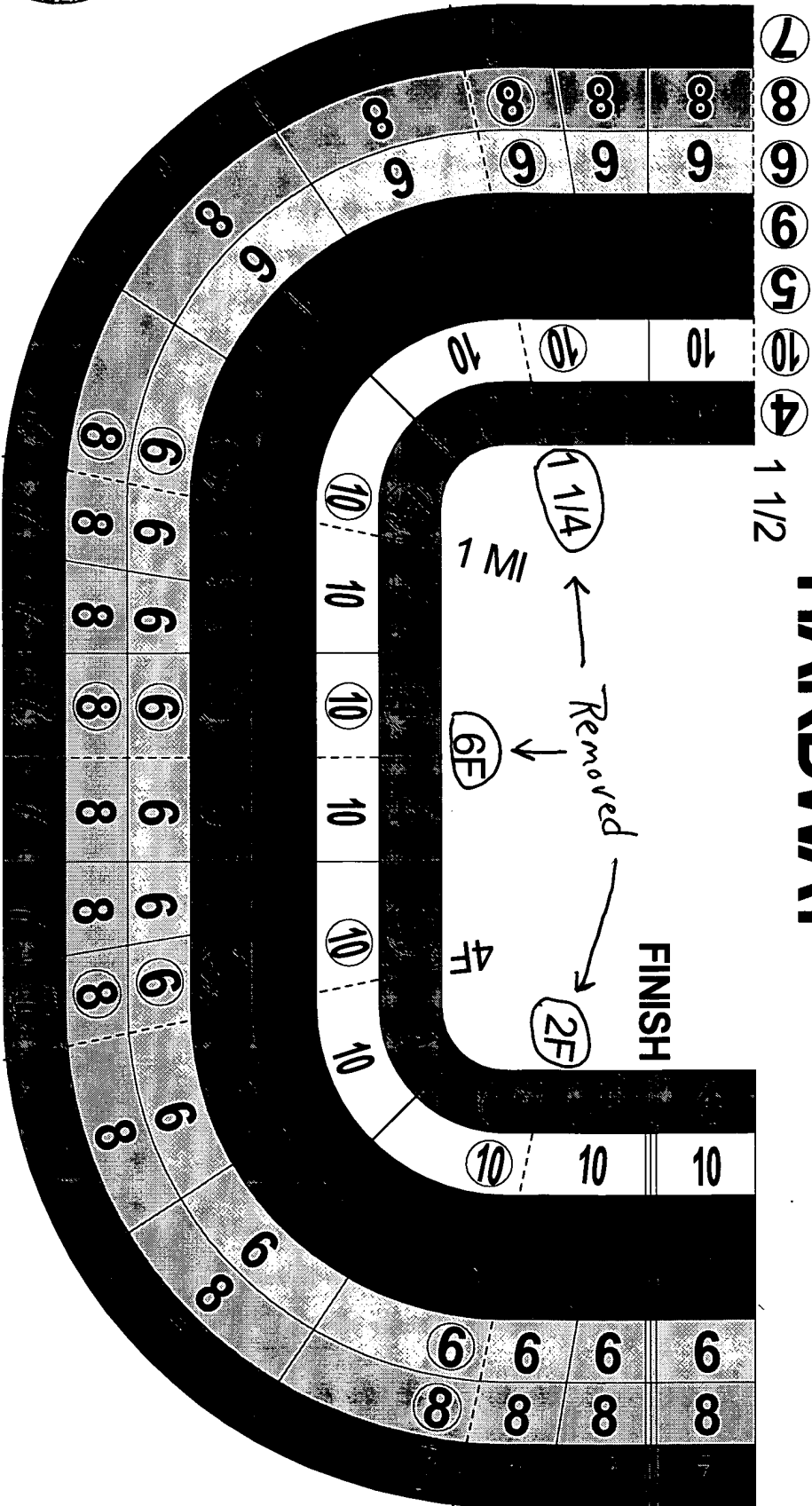most aspects of the game of craps.

SEQUENCE LISTING

Not Applicable.

HARDWAY - Edward A Gaylor - 10/051,947 - ORIGINAL

# HARDWAY

FINISH

1 MI

1 1/4

6F

2F

4F

Removed

1 1/2

Numbers around track: 7, 8, 9, 6, 5, 4
10, 10, 10, 10, 10, 10, 10, 10, 10
8, 9, 8, 9, 8, 9, 8, 9
6, 6, 6, 6, 6, 6, 6, 6
8, 8, 8, 8, 8, 8, 8, 8
6, 6, 6, 6